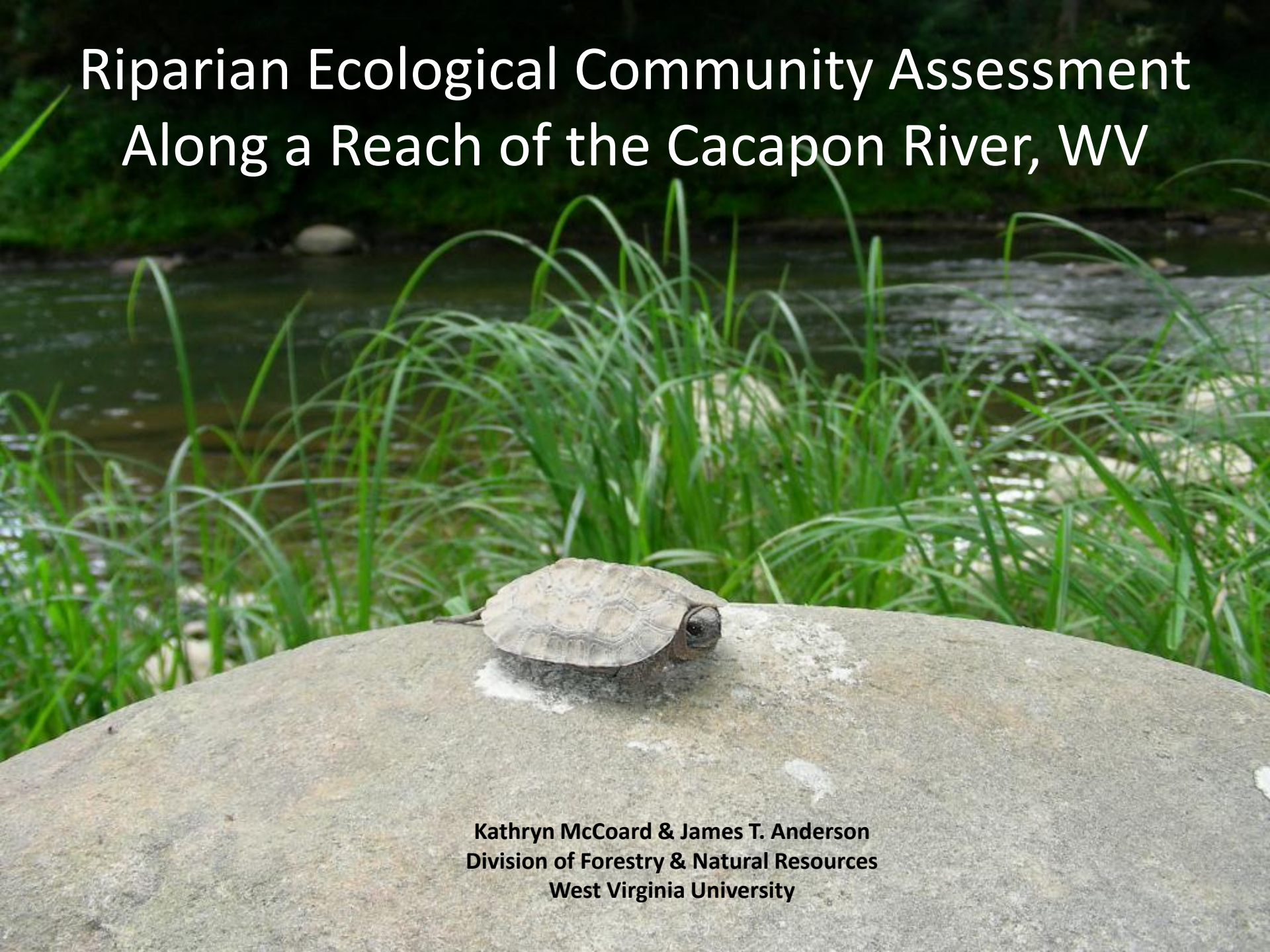
Riparian Ecological Community Assessment Along a Reach of the Cacapon River, WV



Kathryn McCoard & James T. Anderson
Division of Forestry & Natural Resources
West Virginia University

Terrestrial Wildlife & Stream Restoration

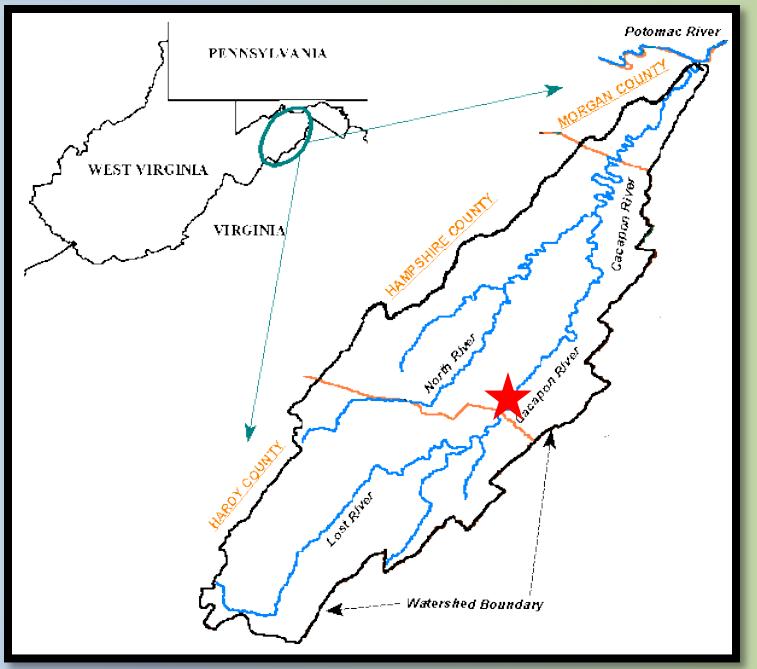
- Vegetation structure and composition impact wildlife
  - Habitat improvement reflected by riparian faunal responses
- Few stream restoration studies monitor terrestrial wildlife
  - Revegetation of riparian zones
    - Increases bird, amphibian, reptile, and small mammal biodiversity
    - Shifts community compositions
  - Young restored sites used by early successional riparian species
  - Older restored sites similar to remnant riparian stands
    - higher abundances & richness of various species (e.g., birds, bats, and beetles)
- Successful if special-status species benefit the native faunal community returns

Study Site

Pre-restoration

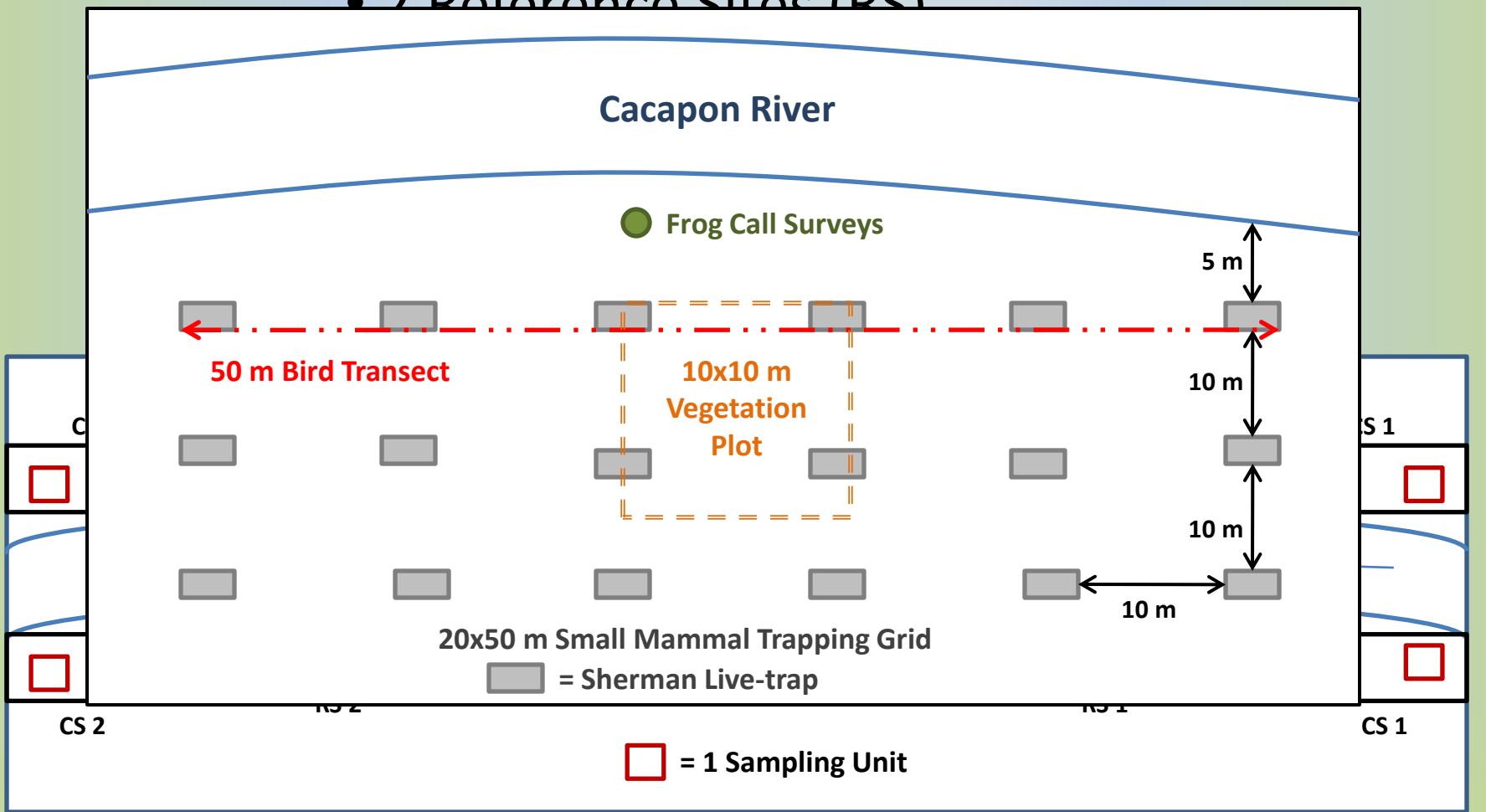
During restoration

Post-restoration



Study Design

- 1,100 m Restoration Reach (RR)
Sampling Unit Diagram
- 8 Sampling Units (SU)
- 2 Reference Sites (RS)



Methods: Birds

- 50 m transects along the river's edge at each SU
  - 5+ minute surveys between sunrise to 4.5 hrs after
  - 1x/month from May 2009- August 2011
- All birds recorded
  - Species & gender
  - Distance from transect & side of river
  - Auditory or visible
  - Activity (if observed)

Results: Birds

Most Abundant Species
1. Song Sparrows (11.6%)
2. Red-winged Blackbirds (9.8%)
3. Blue Jays (5.9%)
4. Downy Woodpeckers (5.1%)
5. Carolina Wrens (3.3%)
6. Indigo Buntings (3.3%)
All others individually <3%

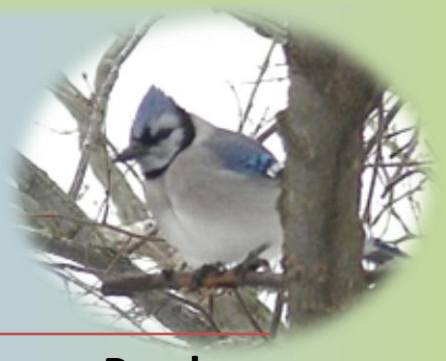
Species	Site	Indicator Value	*P*
Gray Catbird	CS 1	0.2966	0.001
Carolina Wren	CS 1	0.2368	0.010
Common Yellowthroat	CS 1	0.1143	0.028
American Crow	RR	0.3112	0.001
Song Sparrow	RR	0.2961	0.002
Blue Jay	RR	0.2333	0.018
Mourning Dove	RR	0.2296	0.001
Pileated Woodpecker	RR	0.2179	0.002
Northern Cardinal	RR	0.2119	0.002
American Goldfinch	RR	0.1850	0.009
Eastern Kingbird	RR	0.1753	0.016
Belted Kingfisher	RR	0.1753	0.017
Bald Eagle	RR	0.1429	0.004
Yellow-throated Vireo	RR	0.1071	0.042
Common Raven	RS 2	0.0972	0.021
Rock Pigeon	RS 2	0.0833	0.036

78 species over 28 months (May ‘09 – August ‘11)






Results: Birds



	Variable & Direction	F-value	P-value
Abundance	Decreasing Stream Noise	7.58	0.0059
	Site (RR & RS 1 > CS 1)	5.36	0.0003
	River Side (Left)	8.65	0.0033
	Decreasing Air Temperature	9.37	0.0022
	Increasing Distance from Transect	48.22	<0.0001
Diversity	Site (RR > CS 2, & RS 1 & 2)	5.71	0.0003
	Restoration Status (Highest during)	4.71	0.0108
	Month (Highest in July)	2.75	0.0033
Richness	Site (RR > CSs & RSs)	17.07	<0.0001
	Restoration Status (Highest during)	11.00	<0.0001
	Month (Highest April – July)	5.68	<0.0001
Evenness	Site (RR < CS 1 & RS 1)	3.61	0.0082

Methods: Small Mammals

- 20 x 50 m grid (18 Sherman live-traps) at each SU
- Baited with PB & oats mixture wrapped in wax paper
- 2 trap nights/month
  - July & August 2009; June – August 2010; May – August 2011
- Individuals identified to species, weighed, & ear-tagged

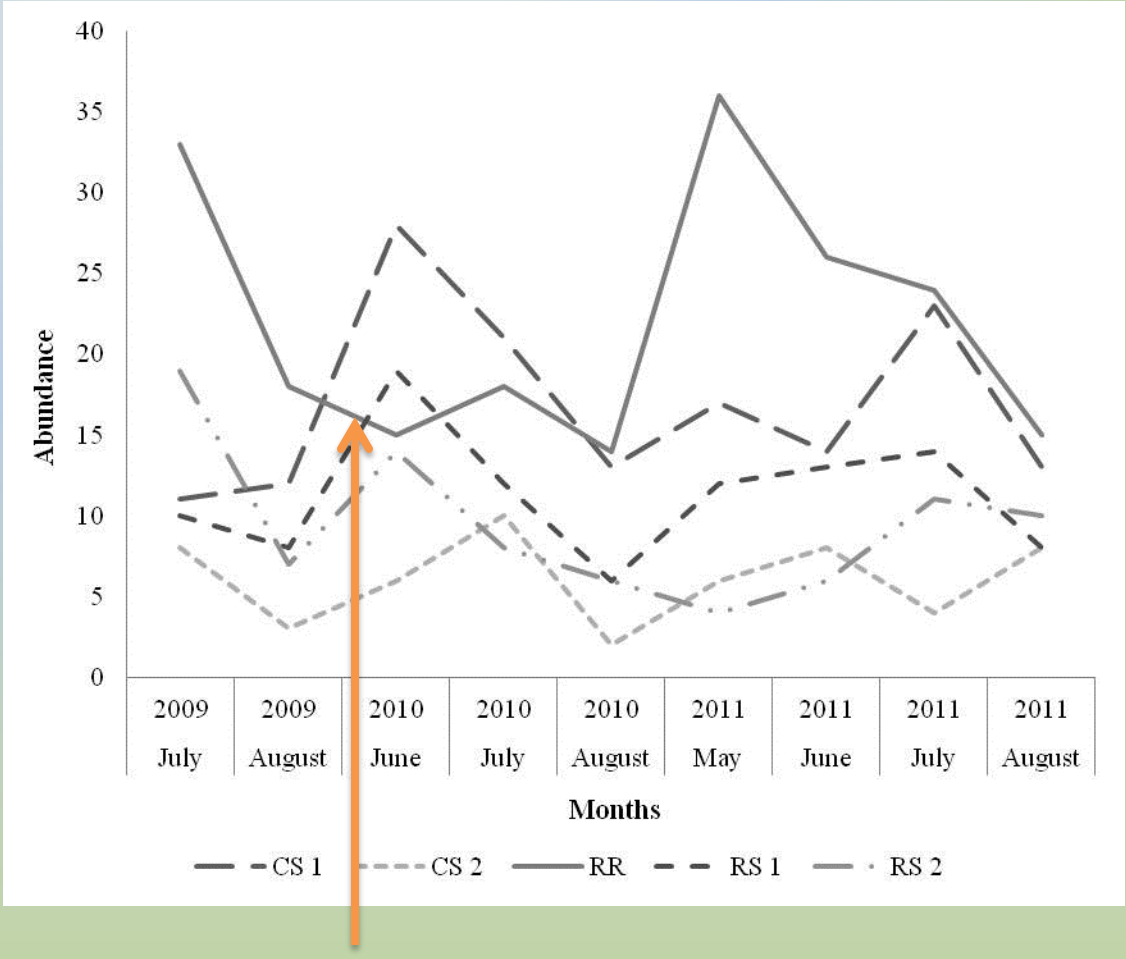
Results: Small Mammals

- 1,043 captures; 408 recaptures; 7,490 trap nights
- No differences in diversity, richness, or evenness
  - sites, restoration status, month, or years
- No difference in site community composition (R = -0.14, P = 0.85)

Species	% Total Captures	Sites
Deer Mouse (*Peromyscus maniculatus*)	96	All 5 sites
Short-tailed Shrew (*Blarina brevicauda*)	0.02	All 5 sites
Meadow Jumping Mouse (*Zapus hudsonius*)	0.009	RR & RS 2
Woodland Vole (*Microtus pinetorum*)	0.004	RR & CSs
Eastern Mole (*Scalopus aquaticus*)	<0.002	RR
Meadow Vole (*Microtus pennsylvanicus*)	<0.002	CS 1

Results: Deer Mice

- 96% of all captures
- Highest abundances:
  - June & July
  - RR & CS 1



Methods: Frog Calls

- Frog call surveys at each SU
  - Survey begins ½ hr after sunset & lasts 5 minutes
  - Record species and calling index (1-3)
- Surveys conducted in April, June, & August








Most to Least Abundant Species
Spring Peepers (*Pseudacris crucifer*)
Gray Treefrogs (*Hyla versicolor*)
Green Frogs (*Lithobates clamitans*)
American Toads (*Anaxyrus americanus*)
Fowler's Toads (*A. fowleri*)
Bullfrogs (*L. catesbeianus*)
Pickerel Frogs (*L. palustris*)
Upland Chorus Frogs (*P. feriarum*)

Results: Frog Calls

	Variable & Direction	F-value	P-value
Abundance	Site (RR > CS 1)	2.53	0.0400
	Restoration Status (Highest pre-)	7.35	<0.0001
	Month (April > August)	5.03	0.0069
Diversity	Site (RR > CS 2 & RS 2; CS 1 lowest)	8.03	0.0001
	Restoration Status (Highest pre-)	4.66	0.0078
	Month (Lowest in April)	11.84	0.0001
Richness	Site (RR > CSs & RSs)	11.61	<0.0001
	Restoration Status (Highest pre-)	7.88	0.0004
	Month (June > April)	3.42	0.0442
Evenness	Month (Lowest in April)	10.42	0.0003

No difference in site community composition ($R < 0.0001$; $P = 0.43457$)

Species of Special Notice

- Wood Turtles (*Glyptemys insculpta*)
  - Declining throughout their range
  - S2: Rare and Imperiled in West Virginia
- Observations made of turtles responding to restoration activities
  - No change of habitat use
  - Began using restoration materials
    - Basking & cover

Conclusions

- Restoration reach ≥ other sites in diversity indices
  - Related to diverse microhabitats
- Most immediate response by deer mice
  - Related to increased riparian herbaceous growth
- Wood Turtles unaffected by restoration
  - Nesting beaches destroyed during bank stabilization
    - New beaches established during floods
- Greater increases in riparian diversity expected

Acknowledgments

- Noah McCoard
- Field help: Steve Selego, Cristiana Pawlik, Logan Moon, & Camille Concepcion
- Landowners: Joe & Josh Frye, Jack & Mike Rudolph, & Sandy & Michelle White
- Arnette Landscapes, Inc
- Red Creek Enterprises
- Bland Fencing LLC


Questions?